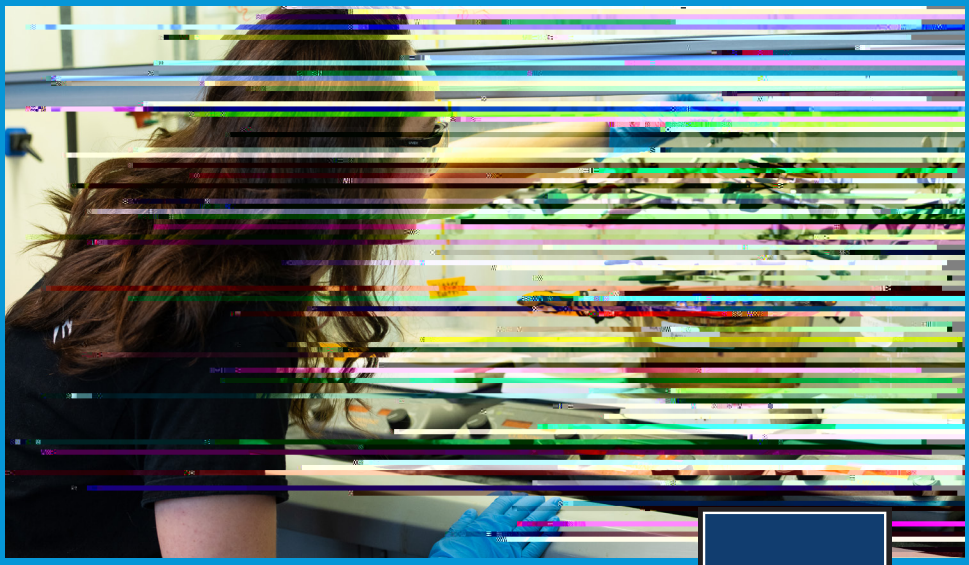
University of New England
College of Arts and Sciences



Saturday • October 2, 2021

SCHEDULE

Saturday, October 2, 2021 | 9 – 11 a.m.
Alfond Center for Health Sciences Lobby

9 – 11 a.m. | Poster Presentations

10:20 a.m. | Remarks

Jonathan Millen, Ph.D.
Dean, College of Arts and Sciences

Aubrey Sahouria (Neuroscience, '21)
President, Research Experience Club

Karen Houseknecht, Ph.D.
Associate Provost for Research and Scholarship

LEGEND

2. Ecosystem Services of Seaweed Aquaculture off the Gulf of Maine

Student Author(s)

Emilly Schutt, M.S. ’22,Hannah Korper ’22, Elena Shippey ’22, Salma Bezzat ’23

Faculty Advisor(s)

Carrie Byron, Ph.D.

Abstract

While natural kelp forests are declining in the Gulf of Maine due to climate change, there is also a decline in the ecosystem services they provide. Ecosystem services include material and non-materia bene ts people obtain from the environment. A possible way to assist in providing these services is through seaweed aquaculture. The supporting service habitat creation will be quanti ed to assess what large mobile commercially important sh and crustaceans are interacting with the kelp farms.

Funded by

The Nature Conservancy, Maine EPSCoR

PRESENTATIONS

1. How does microplastic concentration impact eDNA detection?

Kai Alger '22 | Markus Frederich, Ph.D., Emily Pierce, M.S.

Environmental DNA (eDNA), released by animals into the environment, can be used to detect the presence of marine species. Previous research has found that the level of eDNA in seawater can be impacted by temperature, salinity, pH, and species biomass, but no research has been published yet on eDNA and microplastic particles. This project aims to investigate whether the presence and concentration of different

4. Comparing Atmospheric and Hydrological Factors of the Gulf of Maine: An Investigation of the Warming Gulf

Lydia Pinard '22

7. Advancing American Chestnut *(Castanea dentata)* Restoration through Science, GIS, and Partnerships

Tyler Riendeau '22 | Tom Klak, Ph.D

UNE continues to be a major contributor in chestnut restoration science. Our goals were to better understand pollen viability over time, create the first New England transgenic American chestnut field site, and continue to maintain the Saco GCO. We found time isn't a deterrent for pollen viability and transgenic seedlings grow differently than their wild siblings. This work contributes to the wider effort in restoring the American chestnut back to the eastern US forests.

Summer Undergraduate Research Experience

8. Using laboratory and field trials to test the effectiveness of electronic bycatch reduction devices (BRDs) on sharks in longline fisheries.

Bethany Brodbeck '22 | John Mohan, Ph.D.

Bycatch reduction devices (BRDs) are designed to impair elasmobranchs' electrosensory systems using micro-voltages, which consequently deters individuals from biting baited longline hooks and results in a reduction of bycatch. Using Spiny Dogfish (Squalus acanthias) as a representative species, the effectiveness of these devices was tested. Results indicate a 50% reduction in total predation, as well as predation consistently taking 100% longer when the stimulus was active, validating the possibility of deterrence in the field.

Marine Science Center Summer Undergraduate Research Experience

9. Utilizing dose addition analysis in rodent models of Dopamine D1/mu opioid receptor interactions in the central nervous system to facilitate design of more effective and/or safer drugs to treat pain

Francesca Asmus '22, Ravin Davis '21, Hannah LaCourse '23, Meghan Smith '23, Madison Henderson '24, Emmerson Cahill '24 | Glenn Stevenson, Ph.D.

An FR10 operant schedule was utilized in the presence and in the absence of lactic acid inflammatory pain-like manipulation (therapeutic and side effect endpoints). SKF82958 (D1 dopamine agonist) and methadone (mu opioid agonist) alone produced dose-dependent response rate suppression and restoration of pain-depressed responding. These data extend earlier delta/mu opioid combination experiments, and current studies are testing fixed-ratio mixtures of SKF82958/methadone to determine the nature of D1 dopamine – mu opioid receptor interactions.

This research was supported by a National Institutes of Health (NIAMS) R15 AREA grant (AR054975-02A1) and UNE faculty mini-grant to Glenn Stevenson. A portion of this work was supported by the National Institute on Drug Abuse Drug Supply Program and Dr. Jack Bergman at McLean Hospital/ Harvard Medical School.

10. Investigating Translational Regulation with Open-Source Software and Bioinformatics Tools

Peter Neufeld '23 | Benjamin Harrison, Ph.D.

16. Unraveling the life history of White Hake *(Urophycis tenuis)* within the Gulf of Maine using otolith geochemistry

Benjamin LaFreniere '22 | John Mohan, Ph.D.

White Hake are one of the most understudied groundfish species within the Gulf of Maine. This project utilized the Maine Department of Marine Resources' otolith inventory collected over a 20-year trawl survey. Analyzing otoliths using Laser Ablation ICP-MS allows us to further describe the variations in elemental concentrations of these structures due to both environmental and physiological processes. This data allows us to better inform fishery managers on the lifestyle characteristics of this mysterious species.

Mohan Lab Startup Funds along with collaboration with the Maine Department of Marine Resources

17. Effect of post-harvest drying method on viability of pathogens associated with edible seaweed

Colleen Moody '22, Jessica Vorse '22, Lyle Massoia '22 | Kristin Burkholder, Ph.D., Carrie Bryon, Ph.D.

The purpose of this study was to investigate post-harvest drying methods impact on pathogen load associated with Ascophyllum nodosum (rockweed). Freeze drying and air drying techniques are used to compare which drying method reduces pathogen load. The FDA does not have regulations for seaweed as a food product, so it is important to provide seaweed farmers with data to enable safe post harvest handling of edible seaweed to ensure risk of foodborne illness remains low.

Maine Sea Grant award to C. Byron and K. Burkholder and the CAS Summer Undergraduate Research Experience Program

18. The saphenous nerve is the primary source for sensory innervation of the tibia

Jacob Hickey '21 | Tamara King, Ph.D., Kathleen A. Becker, Ph.D.

The tibia is one of the most common sites of fracture, but the source of tibial

19. Microplastics as vectors for pathogen contamination of seaweed

Lyle Massoia '22, Justin Dixson '22 | Kristin Burkholder, Ph.D.

Microplastics are abundant ocean pollutants and are ingested by marine organisms, including those used for human consumption. There is concern that pathogenic microbes can bind to microplastics. The project goal was to demonstrate that bacterial pathogens bind to microplastics. Successful binding of E. coli was facilitated through pre-treatment of MP fibers with a conditioning solution. Future work will test whether bacteria-associated MP can lead to bacterial accumulation in marine organisms such as bivalves and fish.

Maine Space Grant Consortium and the CAS Summer Undergraduate Research Experience Program

20. Analyzing the genetic structure of ***Quercus rubra*** and ***Pinus strobus*** in order to determine the applications of a community genetics approach in the UNE 363-acre woods

Katrina Kelley '22 | Steve Travis, Ph.D.

Over 12 weeks this summer, I solidified and employed a procedure for the genetic analysis of Eastern white pine samples collected from the UNE 363-acre forest. Although I was not able to determine any results from working on the pine samples, most of the sequencing has been finished. This research has great importance because it provides a framework for future ecological research within the same plots at UNE, as well as similar sites worldwide.

Maine Space Grant Consortium and the CAS Summer Undergraduate Research Experience Program

21. Dietary mercury exposure and subsequent accumulation in ***C. maenas***

Katie Dimm '22 | Stephan Zeeman, Ph.D.

Methylmercury is the organic highly toxic form of the element mercury that accumulates naturally in aquatic organisms. High trophic level organisms have been well documented having high concentrations of the heavy metal; in comparison much less is known about accumulation patterns in those residing at the bottom of the food chain. This study looks to investigate these patterns using dietary mercury exposure in green crabs, a low trophic level and invasive species in Maine.

My project was funded by multiple donors through Experiment. com.
https://experiment.com/projects/dietary-methylmercury-accumulation-in-green-crabs

22. Red Oak Defense Against Herbivory

McKayla Arsenault '22 | Greg Zogg, Ph.D.

Higher leaf mass per area (LMA, g/cm2) is a leaf trait that aids in physical defense against insect herbivores. I conducted an experiment in which leaves from understory oak seedlings were fed to gypsy moth caterpillars. Measures of leaf area consumed and LMA were analyzed to determine whether a difference in LMA between sites exists and if there is a relationship between LMA and leaf area consumed.

Maine Space Grant Consortium and the CAS Summer Undergraduate Research Experience Program

23. The synthesis and structural characterization of antimicrobial pyrogallol-based ketones with varying hydrocarbon chain lengths

Carolyn Curley '23 | Amy M. Deveau, Ph.D.

Molecules with hydrocarbon chains of 10, 11, and 12 carbons were successfully synthesized, purified, and characterized by proton (1H) & carbon (13C) NMR spectroscopy and mass spectrometry. The synthetic compounds are currently being analyzed by the Community for Open Antimicrobial Drug Discovery (COADD) for selective antimicrobial and antifungal activity. This research expands our knowledge of structural patterns found in organic molecules that may effectively impede drug-resistant pathogens that threaten human health.

Maine Space Grant Consortium and the CAS Summer Undergraduate Research Experience Program

24. Pyrogallol impairs ***Staphylococcal*** biofilm formation and may increase microbial susceptibility to antibiotics

Katharina Roese '22 | Kristin Burkholder, Ph.D.

The risk of hospital-acquired bacterial infection is exacerbated by pathogens that can form biofilms on indwelling medical devices and host tissues. One strategy for developing novel antimicrobials is to use drugs that target biofilm formation. Here, we show that the polyphenolic compound pyrogallol impairs biofilm formation in the major hospital-associated pathogens Staphylococcus aureus and Staphylococcus epidermidis. Our findings suggest that pyrogallol-mediated biofilm reduction is caused

25. Health Disparities of COVID-19 within Maine as Related to Race and Ethnicity

Amanda Barrese '22 | Samuel McReynolds, Ph.D.

Racial and ethnic inequalities in health systems are causing higher Covid-19 incidence among marginalized groups. Historically, racial minorities have been affected by disease incidence at higher rates than their white counterparts, but why? In Maine, Black and African American, American Indian/Alaska Native, and Hispanic and Latino people have suffered Covid-19 incidence at a significantly higher rate than any other racial group due to the social determinants of health (SDOH) that influence our lives every day.

St. Francis College Class of 1969 Summer Undergraduate Research Experience

DIRECTORY

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THANK YOU

THANK YOU!

The annual SURE Symposium would not be possible without the support of many individuals and organizations who each contribute in their own way.

First a hearty THANK YOU to the faculty mentors and professional staff who have supported the students in carrying out the research presented here today. Your generosity of time and effort has allowed the students to complete truly remarkable work. Likewise, the College of Arts and Sciences Undergraduate Research Com5pu/Lan 476619 (e5u-US)iC e4qd (a rthe E